

INFORMATION SHEET

WASTE DISCHARGE REQUIREMENTS ORDER NO. R5-2008-_____
JOHN B. VERWEY, ANN M. VERWEY, VERWAY REVOCABLE TRUST
JOHANN DAIRY, FRESNO COUNTY

Background

John B. Verwey and Ann M. Verwey, and the Verwey Revocable Trust, own and operate the Johann Dairy (facility). The facility is about six miles southwest of the town of Raisin City, Fresno County. This dairy currently operates under Waste Discharge Requirements Order No. R5-2007-0035, General Order for Existing Milk Cow Dairies (hereafter "General Order").

On 12 September 2007, the Discharger submitted an application form (Form 200) and a technical report generally describing the dairy operation and containing a plan to install a thermophilic anaerobic digester system (digester) on the facility to treat waste from the dairy operations and imported waste from various sources to produce biogas for sale to the regional gas utility company. Herd population data reported in the RWD are: 3,750 milk cows, 600 dry cows, 2,625 heifers, and 375 calves.

The digester will be owned and operated by Microgy Inc., which is not named as a discharger in the proposed Order. The digester will include a 200,000-gallon capacity steel above ground tank (AGT) to store the supplemental feedstock, a 325,000-gallon capacity steel AGT mix tank, and two 1.5 million gallon AGT digester tanks, with appurtenant pumps and piping. Digester operations will require the feed lanes and free stalls to be vacuumed or scraped rather than routinely flushed. The manure gathered will be added to the mix tank and diluted with freshwater and/or recycled digester effluent to about eight percent (8%) solids.

Supplemental feedstock will also be used in the digester. This supplemental feedstock has been described as food processing waste that may include: non-saleable (off-spec or out-of-date) materials, used cooking oil, grape seed oil, cottonseed oil, floor sweepings from food processing, (protein powders and sugary flavorings), stillage from the manufacture of corn-based ethanol, and fatty water skimmings. Because the project is new, no information is yet available about feedstock in California. Microgy does operate three digesters in Wisconsin and estimated concentrations of some of the constituents are summarized in Table 1.

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Table 1 Selected Constituents and Estimated Concentrations for Supplemental Feedstock	
Constituent	Estimated Concentration
Calcium	984 mg/L
Chloride	2,874 mg/L
Iron	320 mg/l
Sodium	2,062 mg/L
Sulfur	867 mg/L
mg/L – milligrams per liter	

Approximately 74,800 gallons of manure from the mix tank and 30,200 gallons of supplemental feedstock from the supplemental feedstock storage tank will be added to the two digesters daily. The digesters will function as complete-mix reactors with a hydraulic retention time of approximately 21 days. Digester effluent will be removed from the digesters daily and pass through a screw press separator. Separated effluent liquid will be recycled to the manure mix tank or conveyed to the wastewater retention system for holding until it is applied to cropland. Separated digester solids will be stored on a concrete pad until they are used either onsite for animal bedding, or exported from the facility. The biogas will be exported prior to treatment to remove hydrogen sulfide and carbon dioxide: there will be no effluent from gas treatment generated or disposed of on the facility.

The anticipated characteristics of the dairy and digester wastewaters are summarized in Table 2.

Table 2 Wastewater Characteristics		
Constituent	Dairy Wastewater¹	Digester Effluent²
Bicarbonate	2,200 mg/L	Not reported
Calcium	175 mg/L	1,505 mg/L
Carbonate	ND	Not reported
Chloride	210 mg/L	1,185 mg/L
Electrical Conductivity	4,230 μ S/cm	Not reported
Magnesium	85 mg/L	Not reported
Nitrate	3 mg/L	Not reported

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Table 2 Wastewater Characteristics		
Constituent	Dairy Wastewater¹	Digester Effluent²
Nitrogen (Total Kjeldahl)	320 mg/L	2,956 mg/L
pH	7.4	8.3
Potassium	360 mg/L	1,903 mg/L
Sodium	178 mg/L	1,092 mg/L
Sulfur	30 mg/L	362 mg/L
Total Dissolved Solids	2,280 mg/L	12,648 mg/L
1 - Based on average of 200 samples collected from 22 dairies in southern San Joaquin Valley 2 - Source: Larry Walker Associates email of 24 October 2007 from Robert Smith to David Sholes mg/L - milligram per liter µS/cm - micro Siemens per centimeter ND - not detected		

There will be three waste streams and dilution water entering the wastewater retention ponds: process wastewater from the milk parlor, digester effluent, and stormwater runoff from the production area. The Discharger reports that dilution water will be added to the wastewater retention system to reduce salt concentration. Given the operational parameters described in the RWD, the annual average salinity concentration in the wastewater retention ponds should not exceed 3,800 mg/L total dissolved solids (TDS), or 7,050 microSiemens per centimeter (µS/cm) electrical conductivity (EC).

The anticipated dairy and digester operations are estimated to generate approximately 7.1 million cubic feet of wastewater during a typical rainy season. Using the standard assumption of 50-gallons/milk cow/day, the currently existing wastewater retention system appears to have insufficient capacity (approximately 4.2 million cubic feet) to meet the Title 27 CCR §22562 and §22563 requirements. However, estimates of water usage included in the 2007 RWD (22.4 gallons/milking cow/day) indicate sufficient capacity exists. No water use study has been conducted to determine actual water use. This Order requires the submission of a Waste Management Plan (WMP) to demonstrate that waste management facilities, equipment, and practices in the production area meet the requirement of the Order.

Groundwater Conditions and Existing Land Use

The regional unconfined to semi-confined groundwater is approximately 190 feet below ground surface (bgs), according to information in *Lines of Equal Depth to Water in Wells, Unconfined Aquifer, San Joaquin Valley*, published by DWR in Spring 2005.

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The E-Clay layer of the Tulare Formation occurs about 550 feet bgs, and separates the upper aquifer from a lower, sometimes confined aquifer below the E-Clay. Although flow between the two aquifers was originally restricted, some agricultural wells within the vicinity may be screened within the upper and lower aquifers. The uppermost aquifer has the potential to have hydraulic continuity with the lower aquifer though wells that penetrate both, resulting in lower quality water from the uppermost aquifer to migrate into the higher quality waters just above and below the E-Clay.

Existing onsite production wells onsite include at least nine wells. There is currently no groundwater monitoring system installed at the facility other than the monitoring of existing production wells.

Samples collected on 1 May 2002 from six wells were analyzed for general mineral constituents, the results of which are transcribed in Table 4.

Table 4 Selected Constituents From Supply Wells							
	Units	Dairy Well	Ag Well #2	Ag Well #3	Ag Well #4	Ag Well #5	Ag Well #8
Calcium	mg/L	38	6	44	48.1	22.0	102.2
Magnesium	mg/L	3.6	1.2	4.8	6.1	2.4	13.4
Sodium	mg/L	50.6	66.7	64.3	66.7	46	96.6
Chloride	mg/L	63.8	39	63.8	95.7	46.1	127.6
Sulfate	mg/L	33.6	9.6	57.6	57.6	24	134.5
Nitrate-N	mg/L	3.9	0.5	2.8	1.1	0.4	5.7
Iron	mg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Manganese	mg/L	<0.1	<0.1	0.2	0.2	0.1	<0.1
Boron	mg/L	<0.1	0.4	<0.1	<0.1	<0.1	<0.1
pH	standard units	7.6	8.1	7.7	7.6	7.7	7.3
EC	µmhos/cm	500	300	500	600	300	100

mg/L - milligrams per liter
 µmhos/cm - micromhos per centimeter

Land use in the facility vicinity is agricultural with scattered farmsteads, including other confined animal operations. Crops grown within five miles of the facility include corn (forage), wheat (forage), alfalfa, plums, almonds, dry beans, grapes and cotton according to DWR land use data published in 1994.

The most prevalent soils on the facility are classified as Traver fine sandy loam, Hesperia sandy loam, Traver sandy loam, and Calhi loamy sand, according to the USDA Natural Resources Conservation Service. Four soil borings drilled in the vicinity of the wastewater ponds in 2002 to depths ranging from 22 feet to 30 feet below ground surface (bgs) encountered sandy loam, loamy sand, and sand.

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Basin Plan, Beneficial Uses, and Regulatory Considerations

The Basin Plan indicates the greatest long-term problem facing the entire Tulare Lake Basin is increasing salinity in groundwater, a process accelerated by man's activities and particularly affected by intensive irrigated agriculture. Although a valley-wide salt drain is a desired future alternative for concentrated salt sources, Basin Plan policies and programs focus on controlling the rate of increase of salt in the Basin from all controllable sources, and particularly point sources of waste.

The procedure for the Regional Water Board to follow in establishing numerical limitations in waste discharge that will implement Basin Plan narrative objectives is described in pages IV-21 through IV-23 of the Basin Plan. The Regional Water Board must consider, among other things, information submitted by a Discharger and other interested parties and relevant numerical criteria and guidelines developed or published by other agencies and organizations on harmful concentrations of constituents.

The constituent concentrations to be included in the proposed Order and summarized in Table 5 below are what the Basin Plan and referenced documents of recognized authorities indicate cannot be exceeded without causing some adverse impact on the listed beneficial uses. For agricultural use and the waste constituents listed, crop application is consistently more sensitive than animal uses, but there may be several concentration thresholds that apply dependent upon the crop and how irrigation takes place.

While insufficient data has been reported to establish background groundwater conditions, it appears that groundwater in the regional production aquifer beneath the facility is of good quality and suitable for all beneficial uses. This Order requires the installation of a groundwater-monitoring network to monitor the impact of the discharge and help develop long-term groundwater limits, the development of which is discussed further in the Antidegradation section below.

The Order uses the constituent concentrations summarized in Table 5 as interim groundwater limitations while a Groundwater Limitations Analysis is performed to determine if more stringent groundwater limitations are needed to protect water quality. These interim groundwater limitations are based on either the maximum contaminant level (MCL) for the constituent as published in Title 22 CCR or other designated Basin Plan objectives.

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Table 5 Summary of Interim Receiving Water Numerical Limitations				
Constituent	Units	Value	Beneficial Use	Criteria or Justification
Boron	mg/L	1.0	AGR ²	Boron sensitive crops ³
Chloride	mg/L	250	MUN ¹	Recommended Secondary MCL ⁵
Conductivity (EC)	µmhos/cm	900	MUN ¹	Recommended Secondary MCL ⁵
Nitrate as N	mg/L	10	MUN ¹	Primary MCL ⁴
Total Coliform Organisms	MPN/100 mL	2.2	MUN ¹	Basin Plan
Total Dissolved Solids	mg/L	500	MUN ¹	Recommended Secondary MCL ⁴

Notes:

1 - Municipal and domestic supply

2 - Agricultural supply

3 - Ayers, R. S. and D. W. Westcot, Water Quality for Agriculture, Food and Agriculture Organization of the United Nations – Irrigation and Drainage Paper No. 29, Rev. 1, Rome, (1985)

4 - Title 22, CCR, section 64431, Table 64431-A

5 – Title 22, CCR, section 64449, Table 64449-B

Antidegradation

The antidegradation directives of State Water Board Resolution No. 68-16, “Statement of Policy With Respect to Maintaining High Quality Waters in California,” or “Resolution 68-16” require that waters of the State that are better in quality than established water quality objectives be maintained “consistent with the maximum benefit to the people of the State.” Policy and procedures for complying with this directive are set forth in the Basin Plan.

Certain dairy and digester wastewater constituents are not fully amenable to waste treatment and control and it is reasonable to expect some impact on groundwater. Degradation is likely to occur from waste handling and storage and application of wastes to cropland. However, there is some uncertainty over the degree of that degradation given that the combined dairy discharge has not been initiated.

Digester effluent quality data used to develop this Order comes from one of Microgy’s digesters in Wisconsin and while it is sufficient to provide a general understanding of the character of the discharge it is insufficiently detailed to perform a BPTC analysis or set consistent long-term groundwater limits that reflect full implementation of BPTC. Given the limited information, this Order takes a phased approach. Interim groundwater limitations assure protection of the existing beneficial uses of groundwater while this process takes place.

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The Order first requires technical reports in the form of a BPTC technical evaluation for each component of the facility's waste treatment and control to determine for each waste constituent BPTC as used in Resolution 68-16, a Nutrient Management Plan (NMP) for the cropland, and Salinity Evaluation and Minimization Plan for salinity control of facility waste. The results of these technical evaluations and water quality data from required groundwater monitoring will be used to develop numeric groundwater limitations for each waste constituent that reflects full implementation of BPTC and compliance with the most stringent applicable water quality objectives for each constituent. Lastly, the Order may be reopened to incorporate changes to the interim groundwater water limitations, or waste handling and treatment technologies, deemed necessary to implement BPTC.

Proposed Order Terms and Conditions

The recently adopted Waste Discharge Requirement General Order R5-2007-0035 for Existing Milk Cow Dairies (Dairy General Order) has set new standards for waste management on dairy facilities. The requirements specified in the propose Order largely reflect those of the Dairy General Order except where specific circumstances require different or more stringent discharge specifications or provisions.

California Environmental Quality Act (CEQA)

This Order rescinds the dairy's coverage under the Waste Discharge Requirement General Order R5-2007-0035 for Existing Milk Cow Dairies (Dairy General Order). The Dairy General Order was found to be exempt from CEQA provided that the dairy did not expand its cow numbers beyond those that existed as of 17 October 2005. Prohibition A.10 of this Order prohibits the Discharger from exceeding their October 2005 herd numbers, with a 15 percent increase allowance to accommodated normal fluctuations in herd size.

For the digester project at this facility, Fresno County is the lead agency pursuant to CEQA and has prepared an Initial Study and a Mitigated Negative Declaration. The Regional Water Board, as a responsible agency for the purposes of CEQA, reviewed and will considered the Mitigated Negative Declaration prepared by Fresno County in _____. [As of the date of the draft Information Sheet, the Regional Water Board has not received the lead agency's CEQA documents but has consulted regarding water quality issues. The findings and, if necessary, requirements of the proposed Order will be revised following review of the Mitigated Negative Declaration.] There is a potential for water quality impacts from both the dairy and the digester operations.

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The proposed Order implements measures necessary to mitigate any adverse impacts to groundwater from the dairy and digester operations to less than significant levels by including the following:

- Prohibitions, Specifications, and/or Provisions to prevent discharge of waste to surface water
- Prohibitions, Specifications, and/or Provisions to prevent discharge of waste from causing exceedance of groundwater quality objectives, pollution or contamination of groundwater, and/or creation of nuisance conditions.
- Set groundwater limitations based upon the water quality objectives of the Basin Plan.
- Requires the Discharger to demonstrate the best practicable treatment or control (BPTC) of the discharge necessary to avoid a pollution or nuisance and to maintain the highest water quality consistent with the maximum benefit to the people of the State consistent with Resolution 68-16.

Discharge Prohibitions, Specifications and Provisions

The proposed Order prohibits the discharge of wastes to surface water. This includes natural and man-made water bodies and conveyances whether surface water is present or not at the time of discharge. In the event such a discharge occurs due to a failure of proper waste management, the proposed Order specifies monitoring and mitigation of the surface water body affected. The actions required by the proposed Order include:

- Immediate termination of the discharge.
- Notification of regulatory agencies (Regional Water Board, County Health Department, Fish & Game, etc.) within 24 hours of discovery.
- Investigation to determine the extent and magnitude of the discharge impact.
- Mitigation of the degradation caused by the discharge.
- A plan to prevent recurrence of the discharge.

This proposed Order prohibits discharge of waste to groundwater that causes or contributes to exceedances of water quality objectives. This proposed Order reduces the threat of degradation of groundwater by requiring the Discharger to:

- Submit a hydrogeologic report for the area affected or potential affected by the facility to the Executive Officer. The technical report shall describe the underlying geology, existing wells (active or otherwise), well restrictions, and hydrogeology. The report shall include a Monitoring Well Installation Work

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Plan that recommends a monitoring well network to collect data from the unconfined to semi-confined, regional production aquifer up gradient from the influence of the facility and down gradient from each of the waste management areas (e.g., corrals, wastewater retention ponds, digester works, and cropland). The network shall be sufficient to evaluate performance of BPTC measures and to determine compliance with the Order's Groundwater Limitations. The recommendations shall be reviewed and approved by the Executive Officer..

- Conduct a performance evaluation of existing waste handling equipment, facilities, and an evaluation of BPTC for the waste handling and disposal activity. A critical waste management element to be evaluated is the existing wastewater retention system. The wastewater retention ponds must be evaluated for their effectiveness to control seepage of wastewater to the upper regional aquifer below the shallow water zone. The report must include a review of treatment and control technologies, and propose BPTC measure for retention ponds.
- Develop and implement a Waste Management Plan (WMP) to document waste handling and management measures. If the existing conditions do not comply with Title 27 confined animal facility regulations, interim modifications would be proposed to mitigate the problems. The WMP will include a schedule of milestones and completion dates for any necessary construction and/or retrofitting of the existing physical plant.
- Develop and implement a Nutrient Management Plan (NMP) to implement waste application practices in the cropland. The NMP will provide a schedule of waste and irrigation water application formulated to meet the crop needs in each field. The NMP will provide for sampling plan for wastewater, soil, crop tissue, and irrigation water, to collect the data needed to manage waste applications.
- Develop a Salinity Evaluation and Minimization Plan that identifies sources of salt in waste generated at the facility both in the dairy and digester operations. The report should evaluate measures that can be taken to minimize salt in the facility waste, and provide a schedule to implement these measures identified to minimize salt in the waste with the NMP.
- Develop and implement groundwater monitoring to assess the performance of the facility in meeting this proposed Order's specifications and limitations.
- Prepare a final Groundwater Limitations Analysis to propose specific numeric groundwater limitations for each waste constituent that reflects full implementation of BPTC and compliance with the most stringent applicable water quality objectives for each constituent. The data from the groundwater monitoring program and the monitoring provisions of the NMP

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will be used to measure the facility's performance. This data will be used in the the Groundwater Limitations Analysis to formulate the subsequent final groundwater limitations.

Initial Compliance Monitoring

This Order prescribes monitoring of digester effluent, wastewater in the retention ponds, and fresh irrigation water. Monthly (and weekly during the rainy season) monitoring of wastewater retention ponds' freeboard to ensure the wastewater retention systems has sufficient capacity to meet the requirements of Title 27 §22562 (a) (i.e., sufficient to retain facility wastewater generated and stormwater runoff from the 25-year, 24-hour storm). Monitoring of the wastewater application amount(s) to cropland by field and monthly monitoring of the mineral and nitrogen character of the digester effluent, wastewater in the retention ponds, and fresh irrigation water are necessary to determine: 1) the amount and basic quality characteristics of the discharge, 2) if the contents of the wastewater retention system are complying with discharge limits for TDS or EC, 3) if the application to cropland is meeting crop needs and not exceeding the salt application limitations, and 4) if there is a material change in the discharge.

The Discharger must monitoring groundwater for waste constituents expected to be present in the discharge, capable of reaching groundwater, and exceeding the groundwater limitations if treatment, control, and environmental attenuation, proves inadequate. For each constituent listed in Section D Interim Groundwater Limitations, of the Order, the Discharger must, as part of each monitoring event compare concentrations of constituents found in each monitoring well (or water supply well) to the background concentration or to prescribe numerical limitations to determine compliance.

Reopener

The conditions of discharge in the proposed Order were developed based on currently available technical information and applicable water quality laws, regulations, policies, and plans, and are intended to assure conformance with them. However, information is presently insufficient to develop final groundwater limitations, so the proposed Order sets limitations for the interim while site-specific, constituent-specific limits are developed in conjunction with a BPTC evaluation. Additional information must be developed and documented by the Discharger as required by schedules set forth in the proposed Order. As this additional information is obtained, decisions will be made concerning the best means of assuring the highest water quality possible that could involve substantial cost. It may be appropriate to reopen the Order if applicable laws, regulations, or site conditions change.